

and bifid at the extremity; *branches* simple, or bearing one or two ramules, alternate, inclined upwards, sometimes furnished with tendrils. *Hydrothecæ* opposite, tubular, slender and gracefully curved, about half their length free and divergent, but not abruptly bent, with a plain suberect aperture. *Gonothecæ* (female) elongate-pyriform, tapering off below and expanding gradually upwards, bristling with strong spines above, arranged on six longitudinal ridges and extending down the upper third of the capsule; (male) ovate, with six longitudinal ridges, terminating above in angular points, the aperture central and sub-conical.

Allied to *S. rosacea*, with which and *S. pinaster* it has been confounded. It is more robust and rigid and of larger growth than the former of these species, and wants its delicate membranaceous texture. The reproductive capsules of the two are totally dissimilar.

Hab. On other zoophytes: North Devon, Cornwall, Brighton, Yorkshire coast, Peterhead (C. W. Peach).

I have also to record the occurrence of the following species on our coasts:—

Clava leptostyla, Agassiz.

On a mussel-shell from Morecambe Bay; obtained by Mr. F. H. West, of Leeds.

Gonothyræa gracilis, Sars.

Birterbuy Bay, Connemara; dredged by G. S. Brady, Esq.

XXXIX.—On *Glyptodon* and its Allies.

By HERMANN BURMEISTER.

FROM a recent French publication I learn that you have published in your valuable Journal a translation of my observations on the species of *Glyptodon* in the public museum of Buenos Ayres, which I published here in the 'Pharmaceutical Review' for 1863. That paper was written in the beginning of the year 1863, when I had in my possession only the entire skeleton referred to and a very few portions of the two other species, at that time the only ones known to me. Now, after the lapse of three years, I am acquainted with *eight* species found in this country; and I therefore send you these *further remarks* on the specific differences, in order to complete and correct my first publication.

I begin my further notices of the skeleton by correcting an error into which I have fallen in saying that the second bone of the neck, which M. Serres has now named "os mesocervicale,"

is composed of *five* anchylosed vertebræ. It consists only of *four*, namely the second to the fifth; and the sixth is free; but the seventh is united with the first and second dorsal vertebræ to form a large piece, which Professor Huxley has named the trivertebrated bone, and M. Serres the "os metacervicale." This piece has always the same general construction in the four different species of which well-preserved examples are now before me; but the mesocervical bone is not always composed of four vertebræ, but in some cases of *five*. The sixth vertebra is then united with the four preceding ones, in the same way as these with each other, and the animal has no free vertebra between the *meso-* and *metacervical* bones.

Out of the four specimens of necks which I have seen belonging to the same number of distinct species of *Glyptodon*, only one is constructed in this way, of five united vertebræ; the other three have only four vertebræ anchylosed.

As we have other portions of the skeletons of these same individuals with scales of the carapace, I can affirm with certainty that these three species with four anchylosed vertebræ have a short conical tail with large rings of conical tubercles, exactly of the form described by me in the species which I have named *G. spinicaudus*. As this is the case, I have decided to abandon my first name, as indicating not a specific, but probably a generic character, and to supply another name of more specific signification. Among the species described by other authors, I find in the work of M. Nodot on *Glyptodon* (which was unknown to me when I wrote my observations) that this author has formed those with short conical tails of tuberculated rings into his genus *Schistopleurum*; that his first species, *S. typus*, which is very fully described, is the same that I had named in our museum *G. elongatus*, on account of the narrow and elongated form of the carapace, and especially of the pelvis; that the second species, *S. gemmatum*, Nod., which has the surface of the carapace much smoother, was therefore named by myself *G. levis*; and that the third species, described by me as *G. spinicaudus*, is unknown to Nodot, unless it be his *G. subelevatus* (p. 94, pl. 11. fig. 1). As this species is smaller, and has the carapace of a more spherical form and the surface of the scales very rough, I now propose to name it *G. asper*.

Nodot's *S. tuberculatum* is not a *Schistopleurum*, but a true *Glyptodon*; for I suppose the tip of the tail figured in the 'Ostéographie,' pl. 1. fig. 5, and copied by Nodot, pl. 8. figs. 7 & 8, to belong to this species. We have in the museum here such a tail as is figured in the 'Ostéographie,' pl. 1. fig. 4 (copied by Nodot, pl. 8. fig. 6), and I am much inclined to affirm that this and the other are of the same species, the construction of our

tail being somewhat intermediate between the two French figures.

The mesocervical bone of four united vertebræ was figured and briefly described as containing from the second to the fifth vertebra, by Lund in the Transactions of the Academy of Copenhagen, where the author names the animal to which this bone belonged *Hoplophorus euphractus*. The genus *Schistopleurum* must therefore be named *Hoplophorus*, the two genera being perfectly identical, and Dr. Lund's name the older one. His other figures of the same animal prove its identity with *Schistopleurum* as completely as that of the mesocervical bone.

As regards the fourth mesocervical bone, with five united vertebræ, I do not know exactly the species to which it belongs; but from the general construction of the bone I am inclined to think that it may belong to *Glyptodon clavipes*, Owen. We have of this species a carapace not so well preserved as that figured by Owen, a well-preserved pelvis, and some other bones. Some months ago I communicated to Professor Owen figures of this pelvis and of the pelvis of *Schistopleurum gemmatum*, then named by me *Glyptodon levis*, as also of my *G. spinicaudus*, now to be named *Hoplophorus asper*, in order to show him the great differences in the construction of the pelvis in these three species. The pelvis of *G. clavipes* is the strongest—the branch of the os pubis, which forms the superior boundary of the foramen obturatorium, especially being much thicker than in the other two species, in which it is as thin as a pencil and much longer, and the foramen obturatorium is much larger. As all these characters of the pelvis in *G. clavipes* indicate a stronger and more solid construction of the skeleton, I think we are justified in believing that the construction of the neck in this species was also stronger than in the others.

The same character of strength, but still more strongly marked, is presented by a pelvis of which I have only one side before me. This pelvis is more than one-half larger than that of *G. clavipes*, has the same strong pubic branch, and a much narrower foramen obturatorium. From the construction of the bone, as well as from the general size of the animal, I conclude that the pelvis belongs to a very large species, of which we have in the Museum the complete tip of the tail. This was described by me in my first memoir as belonging to *G. tuberculatus*, Owen; but having since seen this author's figures copied in Nodot's work (pl. 9), I find that this was a mistake, and that this tail is identical with that figured by Nodot, pl. 8. figs. 3–5, copied from the 'Ostéographie.' Nodot has described, but not named, the species as belonging to two different kinds (pp. 102 & 103). He also gives (p. 100) a short description of two scales, figured (pl. 12. figs. 6 & 7) as *G.*

verrucosus; and these scales belong, in my opinion, to the same animal, to which therefore this name may be applied.

The pelvis in question, which I regard as belonging to this *G. verrucosus*, is well figured in Robin's 'Journal d'Anatomie et de Physiologie' for March 1866, pl. 2, where M. Pouchet describes it as belonging to a new species, *G. giganteus*, founded by M. Serres in a paper which I do not know. This well-executed figure gives a good idea of the strength of the pelvis and the great size of the animal. As the very well-preserved tip of the tail in our public Museum is 2 feet 8 inches long and 7 inches in diam. at its commencement, we may calculate that the animal was 10–12 feet in length, if not more, and that its body was an enormous mass, like a large oval rock. Nevertheless this species was not the largest of the family—the tail of *G. tuberculatus*, figured in the 'Ostéographie,' pl. 1. fig. 4, and preserved in our Museum, being of double the size, comparing its general figure with that of the former. From the precise similarity in the position of the elliptical and radially striated figures on the two tails, I was at first inclined to believe that both belonged to the same species; but as I have now seen three other specimens of both tails of the same form, I must regard them as belonging to different species. To understand their difference in general size, it is sufficient to compare the smallest lateral elliptical figure, like a rosette, on the tails of the three species. In *G. clavipes* this rosette measures $2\frac{1}{4}$ inches, in *G. verrucosus* $4\frac{1}{2}$ inches, and in *G. tuberculatus* $5\frac{2}{3}$ inches. If this difference be truly indicative of the general size, as I believe to be the case, the last-mentioned species was one-fifth larger than that named *G. giganteus* by M. Serres.

With regard to the general form of the tail, I will only repeat what I have already said in my first communication—namely, that the tail of every true *Glyptodon* had rings, probably six in number, before the large cylindrical apex which alone was previously known. This apex contains in its interior ten small vertebræ; and beyond the sacral vertebræ the skeletons have always three or four free vertebræ covered by the hinder part of the carapace. On comparing the size of the bodies of these vertebræ with the first of the apex of the tail, it is evident that there was between them a series of from six to eight vertebræ which were covered by the free rings of the tail. In this way I calculate the total number of the caudal vertebræ of *G. clavipes* at 20–23.

As I am engaged upon extended descriptions of the species in the Museum, to be published in the second part of the 'Anales del Museo publico de Buenos Aires,' which will soon be sent to press, I will not here enter upon any further details, but conclude this communication with a short revision of the species in question.

I. GLYPTODON.

Tail elongated, conical, the rings before the apex formed of flat shields or scales, the apex more or less cylindrical, with a bulbous swelling at its commencement. Mesocervical bone with five united vertebræ.

A. Scales or shields of the carapace with uniform warty sculpture, only the marginal row of the carapace before the marginal tubercles with an elliptical rosette.

1. *G. tuberculatus*, Owen, Nodot.

2. *G. verrucosus*, Nodot (*G. tuberculatus*, nob., in former communication).

B. Scales or shields of the carapace with a central subhexagonal rosette, and six smaller subpentagonal ones on the circumference; the scales of the margin of the carapace before the marginal tubercles with a very large central rosette, occupying nearly the whole shield.

3 & 4. *G. clavipes* auctorum.

Note.—We have in the Museum two different kinds of tails,—the one shorter, broader, and flatter, with an elliptical transverse section; the other longer, thinner, and higher, with a more circular section. I believe they belong to two different species; but as I do not know the exact form of the tail of Professor Owen's *G. clavipes*, I must leave it doubtful which of my species is the true *clavipes*.

II. HOPLOPHORUS, Lund.

Schistopleurum, Nodot.

Tail short, conical, with six rings of large conical tubercles on the end of each ring of the upper side of the tail*. Mesocervical bone consisting of four united vertebræ, the sixth free. Scales of the carapace with one hexagonal figure in the centre, and six pentagonal ones on the circumference.

5. *H. elongatus*, nob. (*Schistopleurum typus*, Nodot).

6. *H. gemmatus*, nob. (*S. gemmatum*, Nodot).

7. *H. asper*, nob. (*G. spinicaudus*, nob. *anteà*).

8. *H. pumilio*, nob., *Anales del Museo publico de Buenos Aires*, i. p. 77. Of this last species I know only the lower jaw, but, from its general figure, I suppose the species to belong to this section.

* As we have in the Museum a well-preserved tail of the species which has been described by Nodot as *S. typus*, with moveable central tubercles on the rings, I can affirm that this construction is not natural, but caused by the imperfect healing of the broken tubercles during the life of the animal. This process is denominated in surgery *artificial articulation*.

Note.—To the description of *H. asper* (= *G. spinicaudus*) I will add that the number of ribs in this species is thirteen pairs, not fourteen, and that the first two pairs of ribs are united to the large excavated manubrium sterni. This is followed by a smaller piece, to which two pairs of ribs are also attached, and which is united with the manubrium by a synchondrosis. Then follow two small sternal vertebræ, to which three pairs of ribs are attached; and then comes the processus xiphoideus. Thus there are seven pairs of true, and six pairs of false ribs.

XL.—*Additional Remarks on the Homologies of the Flowers of Conifers.* By ANDREW MURRAY, F.L.S.

ON looking over my paper on the above subject in last month's 'Annals,' I see that I have scarcely sufficiently unbosomed myself on one point, which, on re-perusal, seems to me to deserve more remark than I gave it.

The point is, whether the bract is the equivalent of the petal or of the calyx. That it is part of the floral envelope I have no doubt; and all that I said regarding it in that capacity (which was the most important point of view in my inquiry) would apply equally to it as either.

The main purpose to which I put it was to prove that the scale was equivalent to the disk, as lying between the pericarp and the petal or floral envelope; and on that point I do not think more need be said. But the question remains,—What particular part of the floral envelope is represented by the bract?

In my last paper I pointed out that the appearance of the scale of the female flower of *Wellingtonia gigantea* might lead to the belief that it was the equivalent of the male scale, and consequently must be the female petal; and I warned the reader against adopting that view, because I considered that the more petaloid character of the bract (a claret-coloured crust in *Wellingtonia*) rendered it improbable that it should be the calyx, and the green scale the petal. Having arrived at this conclusion, I omitted to give, or, rather, I deleted from my paper, an explanation which had occurred to me of the mode in which the scale combined the functions of disk and petal.

On reconsideration, that explanation appears still to have so much to recommend it that I now briefly submit it to the reader as an alternative view of the homology of the bract.

We have seen that the petal of the male flower is merely a continuation of the leaf-scales growing on the twig which bears the flower. That the scale of the female flower seems to be in